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MAC Layer Back-off Algorithm for Ad hoc Networks

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Abstract: Channel efficiency and channel throughput in any network are affected by packet collisions. Reduction of packet collisions plays a greater role in Mobile Ad hoc Networks (MANETs), due to the open medium topology where carrier sensing is not practical or feasible. Consequently, these collision issues introduce a key problem in MANET networks where researchers proposed back-off mechanism to overcome packet collisions. Back-off algorithm is proposed to reduce collisions that happen when more than one node tries sending data on the channel simultaneously. The Binary Exponential Back-off (BEB), the first Back-off algorithm that is deployed in Medium Access Control layer, is used by IEEE 802.11 to avoid collision in MANETs. BEB algorithm uses a uniform random distribution Back-off values to solve the collision problem. In this paper, we propose Fibonacci Liner Increment Back-Off (FLB) algorithm to achieve an effective value for the Back-off timer of the nodes before accessing the channel to avoid collision. We carried on simulations using ns-2 to compare the performance of the proposed protocol with existing protocols like Fibonacci Increment Back-off (FIB), Binary Exponential Back-off (BEB), Pessimistic Linear-Exponential Back-off (PLEB) in terms of packet delivery ratio (PDR), average End-End delay and normalized routing load. Simulation results demonstrated that our FLB algorithm outperforms existing protocols and achieves the best results in routing packets, normalized routing load and End-End delay.